

ABSTRACT

Imaging, object tracking, integration apparatus 100 has tracking system 1, imaging system 3, communication system 5 and integration system 7. Tracking system 1 locates objects in 3-dimensions and determines respective poses. Imaging system 3 acquires object images. Integration system 7 correlates 3-dimensional poses. User communication system 5 provides information, such as images, sounds, or control signals to the user or other automated systems. Image acquisition techniques include X-ray imaging and ultrasound imaging. Images can be acquired from digital files. Imaging system 3 creates a calibrated, geometrically corrected two-dimensional image 110, 210. Correlation system 7 can receive instructions from a practitioner to create, destroy, and edit the properties of a guard. Communications system 5 displays images and calculations to a practitioner, such as a surgeon. Methods can determine geometrical relations between guards and/or present to a practitioner projections of forms of guards.